

I/170366/2024

Hindustan Times— 25 April-2024

Climate crisis compass for water management

India's critical water infrastructure must be built to withstand, respond to, and recover rapidly from climate disruptions

The India Meteorological Department's recent warning on intense heat-wave conditions over parts of eastern and peninsular India comes at a time when Bengaluru is already grappling with a severe water crisis. Heat-waves and compound events increase evaporation rates from water bodies and soil, as well as raise water consumption due to a temporary surge in demand under high temperatures — factors likely to threaten the city's future sustainability.

However, Bengaluru is not alone. Mumbai, Chennai — the list of thirsty metropolises is growing longer by the day, raising concerns about the potential collapse of urban health, safety, and sanitation systems unless urgent action is taken. Indeed, when it comes to extreme heat and other warming-related disasters, India was among the worst-hit nations in 2023, according to a just-released report by the World Meteorological Organization.

Intense heatwaves and El Niño or suppression of monsoons during the summer are not new phenomena for Indian cities. According to a study published in *Nature*, surface temperatures over India have been rising more frequently due to the climate crisis over the past two decades.

With 600 million Indians already facing high-to-extreme water stress and approximately 200,000 people dying annually due to inadequate access to safe water, the situation is projected to deteriorate further due to the increasing frequency of climate crisis impacts. India's demand for water is projected to significantly exceed its supply by 2050.

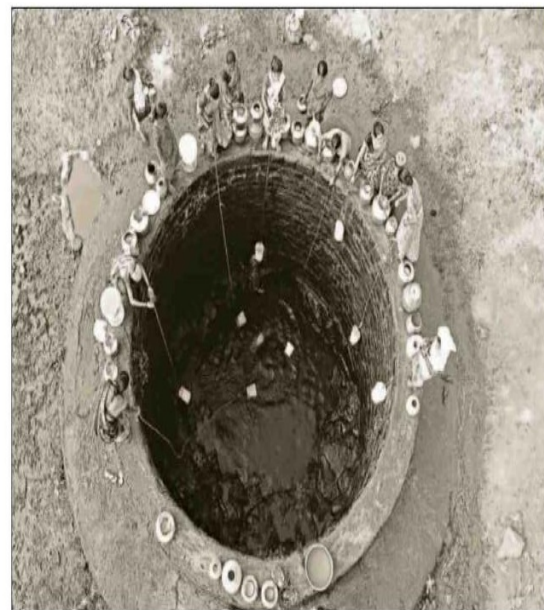
It is therefore urgent for the country to devise a comprehensive framework for water management that could significantly reduce socioeconomic vulnerabilities by anticipating, preparing for, and adapting to changing climate conditions.

India, however, does not lay any explicit focus on the effective integration of climate concerns in its water management. The focus of national government flagship schemes such as the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Jal Shakti Abhiyan, and National Groundwater Management Improvement Scheme, among others, is on providing better service delivery. While the National Action Plan for Climate Change (NAPCC) mandates local governments to include climate adaptation and mitigation strategies in their development projects, studies reveal that their incorporation has remained cursory, mainly focused on compliance. This approach results in missed opportunities for proactively addressing the impact of the climate crisis on water resources in a comprehensive manner.

An aggressive policy framework to integrate climate concerns in all aspects of water management — from planning, design and infrastructure to operation and maintenance — while addressing the financial, technical and capacity challenges is an immediate imperative.

However, a successful transformation of India's water management from a security-centric approach to ensuring its sustainability and resilience requires effective implementation on the ground. Designing efficient climate-adaptive water management systems would require a strong technical capacity for modelling and projection that would inform proactive strategies to address any potential disaster. Such definite risk assessments that include the probability, occurrence, and degree of potential hazard of the climate crisis on water resources are not available to the government.

India should collectively mobilise its existing institutional climate capabilities for predicting water disasters. The Indian Space Research Organisation (Isro), National Remote Sensing Agency (NRSA) and India Meteorological Department (IMD) can significantly help create a comprehensive approach that could guide the design, planning, and delivery of adaptive water management systems. Access to knowledge of traditional or local practices of building water resilience and their dissemination, as well as encouraging the adoption of diverse and locally appropriate techniques, would be crucial. Each of these "day zero" events offers opportunities to



India's demand for water is projected to exceed its supply by 2050 HT PHOTO

carry out simulations and analysis of the climate crisis's impact on water resources.

Lastly, addressing the complex interplay of water-climate crisis and development requires more than just government intervention. Public-private partnerships (PPPs) in implementing challenging climate action projects are emerging as a global model, according to the World Economic Forum. PPP can offer a way for the private sector to complement government efforts, easing budgetary strain and facilitating the sustainable, efficient, and timely implementation of ambitious climate-adaptive water projects.

However, the historical trend of PPPs in India shows that the private sector has limited engagement in water projects. Water management is capital-intensive, with significant fixed costs and returns that accrue over the long term. Despite the potential benefits, only a small fraction of national projects focus on water supply and treatment PPPs, representing just 0.25% of total project expenditure, according to Department of Economic Affairs data from December 2019.

Various factors have discouraged

private sector participation in water PPP projects, including political, regulatory, and financial risks, as well as changes in policy, unrealistic targets, imbalanced transfer of financial risks, and awarding contracts to under-resourced companies. Tariffs set too low for cost recovery have also been a deterrent, barely covering operational and maintenance costs.

To enhance the attractiveness of water PPPs, the government should conduct a thorough review of past successes and failures. Implementing clear legal and regulatory frameworks, establishing supportive institutions, and offering attractive incentives would encourage a steady flow of private finance, knowledge, and capacity to this critical sector.

Bengaluru's situation serves as a stark reminder of the severe water crisis that cities are likely to face in the future. As weather extremes become the "new normal", India's critical water infrastructure must be built to withstand, respond to, and recover rapidly from the disruptions they cause.

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